



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue
Seattle, WWA 98101

Reply To
Attn Of: OW-130

Tom Buchta
Intermountain Region
324 25th Street
Ogden, UT 84401

RE: Thompson Creek Mine Final Supplemental Environmental Impact Statement

Dear Mr. Buchta:

The U.S. Environmental Protection Agency (EPA) has reviewed the subject Final Supplemental Environmental Impact Statement (FSEIS) for the Thompson Creek (TCM) project. Our comments, which follow, are provided pursuant to the National Environmental Policy Act (NEPA) and Section 309 of the Clean Air Act.

Although EPA believes that the preferred alternative makes significant improvements over the existing operating plan (no action alternative), concerns still remain regarding the scope of the analysis and whether the preferred alternative is the most environmentally protective alternative. The following comments focus on the major issues raised by EPA in our comment letter on the draft SEIS dated Aug 17, 1998 which have not been adequately addressed in the FSEIS. A few comments are also directed towards new information the Forest Service included in the FSEIS. Lastly, recommendations for responding to EPA's concerns are presented.

Mine Pit/Scope of Analysis

EPA's draft SEIS comment letter highlighted the need for the EIS to have a fully integrated mine plan that addresses ARD for all mine components for all stages of mine life, including operation, temporary shutdown, reclamation, and post-closure (see comment 10 on draft SEIS). Instead of addressing these concerns substantively, the FSEIS continued to respond only to the SPOO rather than address ARD issues more broadly. Potential impacts from the mine pit were disclosed in general terms but were not characterized as effects and therefore no action alternatives were developed. EPA believes that the FSEIS should have analyzed and disclosed all impacts of ARD and then developed and evaluated alternatives and mitigation measures to address all predicted impacts associated with ARD. EPA continues to believe that the approach taken may result in delays or conflicts in the future.

Alternatives Considered

EPA commented on the draft SEIS that the Forest Service should consider developing an alternative that focuses on separate on-site storage of pyrite concentrations. EPA continues to believe that development of such an alternative may offer an increased level of environmental protection by affording more intensive management and monitoring of sulfidic material. In the FSEIS, such an option was considered at the screening level but was not carried forward for further detailed analysis. EPA believes that the FSEIS has not adequately responded to this comment and that an on-site separate disposal alternative should have been more rigorously explored and evaluated in the FSEIS.

Water Quality Modeling

The FSEIS did not adequately address EPA's comment on water quality modeling (see draft SEIS comment (48 and 71). The FSEIS claims that the modeling assumptions were conservative or even worst case (although at several places in the response to comments they state that best estimates or averages were used). However, with a few exceptions (e.g., the water content assumed in PYROX model), the FSEIS does not provide any information to support the claim that the model input parameters or assumptions were worst case. There are some instances where conservative or worst case conditions were not used, including: the use of average hardness, average pore water chemistry in the impoundment, average data from the Rock Toe, assuming 100% mixing zones, assuming that all of NP is available, assuming that dump seepage is steady state, assuming that neutralization and oxidation occur at similar rates and assuming that material is well mixed.

In most instances, the reader cannot infer whether conservative values were chosen. For example, Table 4-1 was added that lists some of the parameters used in the PYROX model. The table references the documents where the values were obtained but does not state whether each value is conservative. In addition, only one of the input parameters for the HELP model was discussed in the text (this is contrary to the response to comments that said a table would be added to the FSEIS identifying the assumptions and input parameters used in the HELP model).

In addition, we requested that a sensitivity analysis be performed on the important parameters. The USFS response to this is that the amount of uncertainty in the system is so large that a sensitivity analysis would not improve our ability to make quantitative predictions into the future. If the uncertainty is that large, EPA questions the value of the modeling and whether it should in any way serve as a basis for decision making.

New Information

The water quality predictions in the DSEIS were revised mostly as a result of new data supplied by TCMC. The FSEIS states that this is the case and provides new references as to where this new data can be found. It should be noted as well that there was not enough time available to obtain and review these references. However, the FSEIS does not include any obvious independent analysis of the new data. Specific examples include:

- PYROX model: The PYROX model was revised based on information supplied by TCMC.

The FSEIS should go into more detail on what specifically was revised and why the revisions were appropriate. The FSEIS should also provide the calculations that demonstrate that the embankment would continue to have excess neutralization capacity at the end of 100 years.

- **Hydrological and Hydrogeological Evaluation:** EPA requested that the SEIS provide more information regarding the potential for oxidation in the unsaturated tailings behind the embankment and to demonstrate how the pyrite concentrates and whole tailings will remain saturated. The USFS responded by stating that hydrological and hydrogeologic analysis have been conducted and reviewed and have determined that the proposed operation modifications will produce a saturated condition. They then refer the reader to the Thompson Creek Mine Tailings Impoundment Hydrological and Hydrogeologic Evaluation (SRK August 1998) for more information. Since maintenance of a saturated condition is critical to the effectiveness of Alternatives 2 and 3, this new information should have been summarized in the FSEIS (or at least in the response to comments). In this case, the FSEIS did not fulfill the requirements of NEPA that state that “incorporated material shall be cited in the statement and its content briefly described (40 CFR 1502.21).”
- **Precipitates in Squaw Creek:** The DSEIS stated that iron oxyhydroxides would precipitate in the surface water below the tailings impoundment. We expressed a concern that the precipitates could armor stream substrate. USFS responded based on recent modeling that precipitation is not anticipated by Lorax (1998). Lorax modeling focuses on chemical behavior of constituents within the embankment and drain where reducing conditions are expected to be maintained but failed to address potential for formation of precipitates after discharge to surface water (where oxidizing conditions would be expected).

Bruno Creek

In EPA’s comments on the draft SEIS, EPA requested that impacts to Bruno Creek be disclosed. EPA pointed out that Bruno Creek is considered a water of the US, that State water quality standards apply, and that if adverse impacts cannot be avoided (compared to pre-project baseline conditions), then mitigation measures should be considered. In the final EIS, the Forest Service included a discussion of impacts to Bruno Creek. It disclosed that effluent from the tailings facility would be discharged to Bruno Creek at closure, that such discharges would be subject to NPDES permitting, and that Bruno Creek would contain elevated levels of cadmium, iron, and lead (if not otherwise treated). The Forest Service further concluded that these predictions do not “...constitute new adverse impacts of the action alternatives...” and therefore should not be characterized as effects in the final SEIS. EPA agrees that there will be discharges to Bruno Creek at closure, that such discharges will be subject to NPDES permitting, and that such discharges will likely require treatment to meet effluent limits in the future. EPA disagrees with the conclusion that such impacts not be characterized as effects in the final SEIS (for reasons related to purpose and need for the SEIS pointed out elsewhere in our comments). Therefore, EPA recommends that the Forest Service include mitigation measures in its decision that identifies actions necessary to ensure that future discharges to Bruno Creek comply with future anticipated permits and standards. In addition, the need for, and costs associated with such long-term actions (treatment or other means) should be included in the revised reclamation plan and bond recalculation.

Stability/Geotechnical Issues

EPA expressed very serious concerns regarding the long-term stability of the tailings impoundment in our comments on the draft SEIS. The concern stems from the proposal to maintain the pyritic tailings in a flooded/saturated state while maintaining a dry embankment. Given the proximity of the tailings impoundment to the Salmon River, a state special resource water, any uncertainties regarding the risk of failure must be very carefully evaluated and narrowed to the extent possible (see also bonding discussion below).

It is our present view that the remaining uncertainties with respect to the long-term stability and risks to the integrity of the embankment are too great to merit approving the SPOO at this time. The reasons for our continued level of concern include:

- Modeling of the existing and predicted future phreatic surface within the embankment has not been sufficiently reviewed nor does it appear to account for potential geochemical reactions that have and may continue to occur within embankment sands or within the drain. Appendix D of the FSEIS references the Woodward-Clyde stability analyses. Appendix C (Seepage Analysis) of the Thompson Creek Mine Tailings Embankment Toe Drain - Design Report Report (Woodward-Clyde, 1997) uses permeability estimates (e.g., K_h of 2×10^{-2} cm/sec. for tailings sands) that do not appear to be conservative when one considers the potential for production of precipitates, in either reducing or oxidizing environments, such as gypsum and/or metal hydroxides (aluminum, iron or magnesium). The qualitative analysis of the potential for developing such oxidation/reduction precipitates provided in Appendix D of the FSEIS contains statements such as "a reducing environment is anticipated to exist within the embankment..." and that "no evidence is present to suggest that biological sulfate reduction is occurring." Given that such reactions have occurred in the past and have caused the drain to plug and that the proposal will "inhibit" rather than "prevent" oxidation within the embankment, we strongly suggest revisiting the model to account for geochemical processes or using more conservative assumptions to simulate reasonable worst-case permeability scenarios. (We also note that in Shannon and Wilson's review of the Woodward-Clyde reports, they did not have access to Appendix C - the seepage analysis and hydrologic modeling report upon which much of the stability analysis depends).
- The modeling effort described in Appendix C (Seepage Analysis) of the Woodward-Clyde report was evidently calibrated against existing conditions and results corresponded well with observed piezometric measurements. In the analysis for the existing dam, the assumed (conservative) boundary condition seems to imply a supernatant pond located much closer to the tailings dam (several hundred feet) than the actual condition (a few thousand feet). If the observed phreatic surface corresponds well with the modeled surface, this raises questions as to how well the model has been calibrated, i.e., the modeled conservative (worst-case) condition should produce a phreatic surface higher than what is observed.
- To aid in our review of the SFEIS, EPA hired a contractor, Klohn-Crippen, to evaluate the stability issues. A considerable number of reports were reviewed, however, it is unclear if certain critical data are available that have a bearing on resolving much of the uncertainty associated with the stability analyses. Of particular interest are detailed consolidated-

undrained and cyclic shear test and field density test data. There is a very real concern that the unusual height of the sandfill dam can affect the undrained shear behavior of the saturated sandfill at the base of the dam.

The report from Klohn-Crippen is included as an attachment to this letter and describes additional data that would be helpful in completing a more comprehensive review of the stability issues. EPA believes it would be helpful to convene a meeting of technical experts to discuss these matters.

Bonding

Because of the uncertainties regarding long-term water quality and the stability of the tailings impoundment, EPA believes it is critical that sufficient resources are available for long-term maintenance. Adequate bonding is essential to meet this need. Without adequate bonding for O & M costs and provisions to address future problems (e.g., drain reconstruction at some future date) it is not possible to predict future conditions.

While EPA believes TCMC is responsibly managing the facility at present, global competition in the mining industry and fluctuating metals prices can place a financial strain on the resources of any company, particularly as a mine project draws toward the end of its economic production life. At some point in time a mine will be generating no income yet a project may require potentially significant capital for O&M. Adequate financial assurance or bonding must be in place to assure that these needs are met. Simply stating that future conditions will be addressed is insufficient and does not fulfill EIS requirements.

The pyrite removal circuit and changes in management of waste rock were not predicted in the original EIS. They have required significant resources. What would have happened had the mine not reopened and TCMC taken a responsible approach to dealing with these issues? Was adequate bonding in place?

In general, it is our view that risk and uncertainty in predicting future environmental conditions must be addressed through a two-pronged approach. First, the best science should be used to predict future conditions, fully disclosing risks and uncertainty. Secondly, financial assurances must be provided to address the risk and uncertainty that remains following adequate scientific analysis, including the risks and consequences of failure. If risks and uncertainty are low, then bonding/insurance costs should be low. Conversely, if risks and uncertainty are high, financial assurance costs may be high. Regardless, it is critical that such risks are born by the mining company and not the public.

Recommendations

EPA recommends an "interim management authorization" decision for the proposed SPOO. EPA further recommends that the above mentioned deficiencies be further developed and analyzed prior to issuance of the ROD. The following is a bulleted list of recommended actions that EPA

believes should be undertaken in a revised analysis and prior to issuance of the ROD:

- Further analysis is needed to reduce uncertainty regarding the stability of the tailings impoundment.
- Contingency plans need to be established in the event the phreatic surface within the tailings embankment reaches an agreed upon "trigger" level at which stability under seismic loading conditions begins approaching unsafe conditions. Such contingency planning should include bonding for construction of a dam downstream.
- Mitigation measures for Bruno Creek need to be developed.
- Pit Water Study- A schedule for completion of a pit water study needs to be developed.
- Reclamation Plan- Specific reclamation techniques proposed for the preferred alternative and their effectiveness should be part of the revised analysis.
- Bonding- Adequate bonding for O & M costs and provisions to address future contingencies needs to be delineated in the revised analysis.

EPA appreciates the opportunity to review the FSEIS and to provide recommendations that should assist in the development of a project that is protective of environmental resources and respectful of the needs of the company. Questions regarding this letter can be directed to Bill Riley, Office of Water Mining Coordinator, at (206) 553-1412 or Matt Harrington, NEPA Compliance Coordinator, at (206) 553-0246 in our Seattle Office.

Sincerely,

original in file.

Richard Parkin, Manager
Geographic Implementation Unit

Attachment

cc: Bert Doughty, TCMC
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